

AMENDMENT TO THE CLAIMS

1. (*Currently Amended*) A thermoplastic polyurethane composition, comprising:

the reaction product of

a polyester polyol having a number average of molecular weight of from about 500 to about 5,000 comprising polybutylene adipate;

from about 5 to about 20 parts by weight of a polyether co-polyol comprising poly(tetramethylene ether glycol) per 100 parts by weight of the combined total amount of said polyester polyol and said polyether co-polyol;

a diisocyanate comprising diphenylmethane-4,4'-diisocyanate ~~having the formula $R(NCO)_n$, where n is an integer of 2 and R is an aromatic, cycloaliphatic, aliphatic, or combinations thereof having from 2 to 20 carbon atoms;~~

a symmetrical chain extender comprising 1,4-butanediol; ~~selected from the group consisting of 1,6 hexanediol, 1,3 propanediol, 1,5 pentanediol, 1,4 butanediol, 1,4-cyclohexanedimethanol (CHDM), hydroquinone di(β -hydroxyethyl)ether (HQEE), 1,4-benzenedimethylol, and combinations thereof;~~

from about 5 to about 10 moles of a co-chain extender comprising 1,3-butanediol; ~~selected from the group consisting of 1,3-butanediol, neopentylglycol, dipropylene glycol, diethylene glycol, di(β -hydroxyethyl) resorcinol, 1,2-propylene glycol, and combinations thereof~~ per 100 moles of said symmetrical chain extender;

the ratio of the molar percent of said co-chain extender to said symmetrical chain extender to weight percent of said polyether co-polyol to the combined total weight of said polyester polyol and said polyether co-polyol, being from about 0.2 to about 2,

wherein said reaction product has a reduced annealing value, V_t , of about 4.0 or less and a sensitivity of the complex viscosity to temperature $V_{ft} ((T_m+15)/(T_m+35))$ of about 9 or less; and

wherein said thermoplastic polyurethane polymer has a reduced sensitivity to shear ($V_{ft}(T_m+15)$) of 5 or less).

2. (*Cancelled*).

3. (*Previously Presented*) A thermoplastic polyurethane composition according to claim 1, wherein said reaction product has a sensitivity to shear V_f at $T_m+15^\circ\text{C}$ of about 10 or less or a V_f at $T_m+35^\circ\text{C}$ of about 5 or less.

4. (*Previously Presented*) A thermoplastic polyurethane composition according to claim 3, wherein the number average molecular weight of said polyester polyol is from about 600 to about 4,000; and

wherein the number average molecular weight of said polyether co-polyol is from about 500 to about 4,000, and

wherein said reaction product has a hydrolytic stability, TS_N , of about 0.3 or greater.

Claims 5. to 6. (*Cancelled*).

7. (*Currently Amended*) A thermoplastic polyurethane composition according to claim 4, ~~claim 6~~, wherein said reduced annealing value V_t is about 3.5 or less, wherein said V_f at $T_m+15^\circ\text{C}$ is about 6 or less, and said V_f at $T_m+35^\circ\text{C}$ is about 4 or less, ~~wherein said polyether co-polyol is poly(tetramethylene ether glycol), wherein said diisocyanate is MDI or H₁₂MDI, or combinations thereof, wherein said symmetrical chain extender is 1,4-butanediol; and~~
~~wherein said co-chain extender is 1,3-butanediol, neopentylglycol, or dipropylene glycol.~~

Claims 8. to 12. (*Cancelled*).

13. (*Previously Presented*) A thermoplastic polyurethane composition of claim 1 wherein at least four of the following six (A through E) criteria are met:

- A. a reduced crystallinity expressed as T_{CN} is 0.95 or less,
- B. an improved hydrolytic stability expressed as TS_N is 0.3 or greater,
- C. a reduced sensitivity to shear expressed as $V_f(T_m+15)$ is 10 or less,
- D. a reduced sensitivity to shear expressed as $V_f(T_m+35)$ is 5 or less, and

E. a sensitivity of the complex viscosity to temperature expressed as V_{ft} is 10 or less.

Claims 14. to 18. (*Cancelled*).

19. (*Original*) A coated fabric wherein said coating comprises the thermoplastic polyurethane composition of claim 1.

20. (*Original*) A coated fabric wherein said coating comprises the thermoplastic polyurethane composition of claim 13.

Claims 21. to 22. (*Cancelled*).

23. (*Original*) A sheet or a film comprising the thermoplastic polyurethane composition of claim 1.

24. (*Original*) A sheet or a film comprising the thermoplastic polyurethane composition of claim 13.

Claims 25. to 26. (*Cancelled*).

27. (*Original*) A conveyor belt comprising the thermoplastic polyurethane composition of claim 1.

28. (*Original*) A conveyer belt comprising the thermoplastic polyurethane composition of claim 13.

Claims 29. to 30. (*Cancelled*).

31. (*Original*) An inflatable article, an apparel, or a storage bag comprising the thermoplastic polyurethane composition of claim 1.

32. (**Original**) An inflatable article, an apparel, or a storage bag comprising the thermoplastic polyurethane composition of claim 13.

Claims 33. to 34. (**Cancelled**).

35. (**Currently Amended**) A process for producing a thermoplastic polyurethane polymer comprising reacting:

A. a polyester polyol having a number average molecular weight of from about 500 to about 5,000 comprising polybutylene adipate;

B. from about 5 to about 20 parts by weight of a polyether co-polyol comprising poly(tetramethylene ether glycol) per 100 parts by weight of the combined total amount of said polyester polyol and said polyether co-polyol;

C. a diisocyanate comprising diphenylmethane-4,4'-diisocyanate;

D. a symmetrical chain extender comprising 1,4-butanediol; ~~selected from the group consisting of 1,6-hexanediol, 1,3-propanediol, 1,5-pentanediol, 1,4-butanediol, 1,4-cyclohexanedimethanol (CHDM), hydroquinone di(β -hydroxyethyl)ether (HQEE), 1,4-benzenedimethylol, and combinations thereof~~;

E. from about 5 to about 10 moles of a co-chain extender comprising 1,3-butanediol; ~~selected from the group consisting of 1,3-butanediol, neopentyl glycol, dipropylene glycol, diethylene glycol, di(β -hydroxyethyl)resorcinol, 1,2-propylene glycol, and combinations thereof per 100 moles of said symmetrical chain extender~~; and

wherein the ratio of the molar percent of said co-chain extender to said symmetrical chain extender to weight percent of said polyether co-polyol to the combined total weight of said polyester polyol and said polyether co-polyol, is from about 0.2 to about 2; and

wherein said thermoplastic polyurethane polymer has a reduced sensitivity to shear ($V_f(T_m+15)$) of 5 or less.

36. (**Previously Presented**) The process of claim 35 further comprising a thermoplastic polyurethane catalyst in an amount less than about 1000 parts by weight per million parts by weight of the combined weight of said polyester polyol, polyether co-polyol, diisocyanate, symmetrical chain extender and said co-chain extender.

37. (*Previously Presented*) The process of claim 36 wherein said process is conducted in a twin screw extruder where the reactants are brought together and reacted.

38. (*Original*) The process of claim 37 wherein said process is conducted at from about 110°C to about 200°C.

39. (*Original*) The process of claim 38 wherein the reaction time is from about 2 to about 3 minutes.

Claims 40. to 43. (*Cancelled*).

44. (*Currently Amended*) The thermoplastic polyurethane composition of claim 1 ~~claim 43~~ wherein the mole ratio of the diisocyanate over all the dihydroxyl terminated compounds, that is ~~[[to]]~~ the combination of the polyester polyols, the polyether copolyols, the symmetrical chain extender, and the co-chain extender, is from 0.98 to 1.03; and the mole ratio of the chain extenders, that is the combination of the symmetrical chain extender and the co-chain extender, over the polyols, that is ~~[[to]]~~ the combination of the polyester polyol and the polyether polyol, is from 0.7 to 3.

45. (*Cancelled*).

46. (*Currently Amended*) The process of claim 35 ~~claim 45~~ wherein the mole ratio of the diisocyanate over all the dihydroxyl terminated compounds, that is ~~[[to]]~~ the combination of the polyester polyols, the polyether copolyols, the symmetrical chain extender, and the co-chain extender, is from 0.98 to 1.03; and the mole ratio of the chain extenders, that is the combination of the symmetrical chain extender and the co-chain extender, over the polyols, that is ~~[[to]]~~ the combination of the polyester polyol and the polyether polyol, is from 0.7 to 3.

47. (*New*) The thermoplastic polyurethane composition of claim 1 wherein said thermoplastic polyurethane polymer has a reduced sensitivity to shear ($V_f(T_m+15)$) of 5 or less.
48. (*New*) The process of claim 35 wherein said thermoplastic polyurethane polymer has a reduced sensitivity to shear ($V_f(T_m+15)$) of 5 or less.